动 物 学 研 究 2007, Oct. 28(5): 531－538 CN 53-1040/Q ISSN 0254-5853
Zoological Research

A New Labeonine Fish Species, *Parasinilabeo longiventralis*, from Eastern Guangxi, China (Teleostei: Cyprinidae)

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Abstract: *Parasinilabeo longiventralis*, a new species is here described from He jiang basin, a tributary of the Zhujiang River (Pearl River) drainage in Fuchuan County, Guangxi Province, southern China. It can be distinguished from all other congeners by having the following combination of characteristics: maxillary barbels length is 78.3−90.4% of rostral barbels length; pelvic-fin length is 83.7−89.4% of the distance between the ventral-fin origin and to the anal-fin origin; a longitudinal wide black stripe running along the posterior lateral line and irregular brown pigments on the sides of the body.

Key words: *Parasinilabeo*; Hejiang; Guangxi; China

广西东部野鲮亚科鱼类一新种——长鳍异华鲮

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摘要：新种长鳍异华鲮 *Parasinilabeo longiventralis* 采自中国南部广西省富川县境内珠江水系的一条支流——贺江。新种与异华鲮属（*Parasinilabeo*）内的其他种的主要区别特征是：口角须长为吻须长的 78.3%—90.4%; 腹鳍长度为腹鳍起点和臀鳍起点间的距离的 83.7%—89.4%；在侧线鳞的后方有一宽的褐色纵条纹；体上有不规则的斑点。

关键词：异华鲮；贺江；广西；中国
中图分类号：Q959.468 **文献标识码**：A **文章编号**：0254-5853(2007)05-0531-08

The validity of *Parasinilabeo* was argued by many ichthyologists. Su et al (2001) erected a new genus *Pararectoris* to replace *Parasinilabeo*. Kottelat and Zhang (2003) recovered *Parasinlabeo* and made genus *Pararectoris* its junior synonym. At present, five species of *Parasinilabeo* were described by Wu et Yao (1939), Zhang (2000), Su et al (2001) and Zhu et al (2006). They are: *Parasinilabeo assilimis* Wu et Yao (1939), *Parasinilabeo maculatus* Zhang (2000), *Parasinlabeo longicorpus* Zhang (2000), *Parasinilabeo microps* Su, Yang et Cui (2001), *Parasinilabeo longibarbus* Zhu, Lan et Zhang (2006). *Parasinilabeo* only occurs in the Changjiang drainage (Yangtze River) and the Zhujiang drainage (Pearl River) in China. Its distribution is from Zhujiang drainage (Pearl River) in Guangxi to the drainage in southern bank of Changjiang (Yangtze River) in Anhui of south China (Fig.1). *Parasinilabeo microps* and *P. maculatus* only occur in the middle and the lower Changjiang drainage. *Parasinilabeo longicorpus* and *P. longbarbus* occur in the middle and the lower Zhujiang drainage. *Parasinilabeo assilimis* can often be found in both the Changjiang drainage and Zhujiang drainage. In 2002, Mr. LAN Jia-hu collected some specimens from

Received date: 2007-03-28；Accepted date: 2007-08-24
Foundation item：National Basic Research Program of China (973 Program) （2007CB411600）；The National Natural Science Foundation of China （30730017、90411002）.
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收稿日期：2007-03-28；接受日期：2007-08-24
基金项目：国家重点基础研究发展计划资助（2007CB411600）；国家自然科学基金资助项目（30730017、90411002）

Fuchuan County, Guangxi, China. By comparison to all existing species of *Parasinilabeo*, it was proved to be an undescribed species of *Parasinilabeo* and is described as *Parasinilabeo longiventralis* sp. nov. herein (Fig.1).

1 Materials and Methods

Examined specimens were deposited in Kunming Institute of Zoology (KIZ), the Chinese Academy of Sciences and Institute of Hydrobiology (IHB), the Chinese Academy of Sciences.

Measurements and counts were made on the left side of specimens, if possible. Counts and measurements followed Hubbs & Lager (2004) except that lateral line scales also included the scales on the caudal-fin base. Additional measurements included: gape width, which is the distance between corners of the mouth, the distance from the anterior origin of the pectoral-fin to that of ventral-fin (DPV) and the distance from the anterior origin of ventral-fin to that of anal-fin (DVA). The measuring method of pre-pectoral length, pre-ventral length and pre-anal length is the same as the measuring method of pre-dorsal (Hubbs & Lager, 2004). The method used to measure dorsal-fin length and anal-fin length is the same as that used to measure the height of the dorsal-fin and anal-fin (Hubbs & Lager, 2004). Subunits of the head and fin lengths were given as percentages of the head length. Head length itself and measurements of all other parts of the body were given as percentages of the standard length. Other proportions and ratios are listed in Tab. 1 and Tab.2. Caudal-peduncle depth was given as aproportion of standard length and caudal peduncle length, respectively. Abbreviations are listed as follows: A (number of anal-fin rays); BR (rostral barbels length); BM (maxillary barbels length); BW (body width); CL (length of caudal-fin); CML (length of median ray of caudal-fin); CPD (caudal-peduncle depth); CPL (caudal-peduncle length); CS (circumpeduncular scales); D (number of dorsal-fin rays); DPV (distance of pectoral-fin to ventral-fin origin); DVA (distance from pelvic-fin to anal-fin origin); HL (head length); LLS (lateral line scales); P (number of pectoral-fin rays); PS (predorsal scales); SL (standard length); SL-D (scales between lateral line and dorsal-fin origin); SL-V (scales between lateral line and ventral-fin origin); TL (total length); V (number of ventral-fin rays).

The Chinese river Yangtze River and Pearl River have their own local Chinese name. They are respctively Changjiang and Zhujiang.

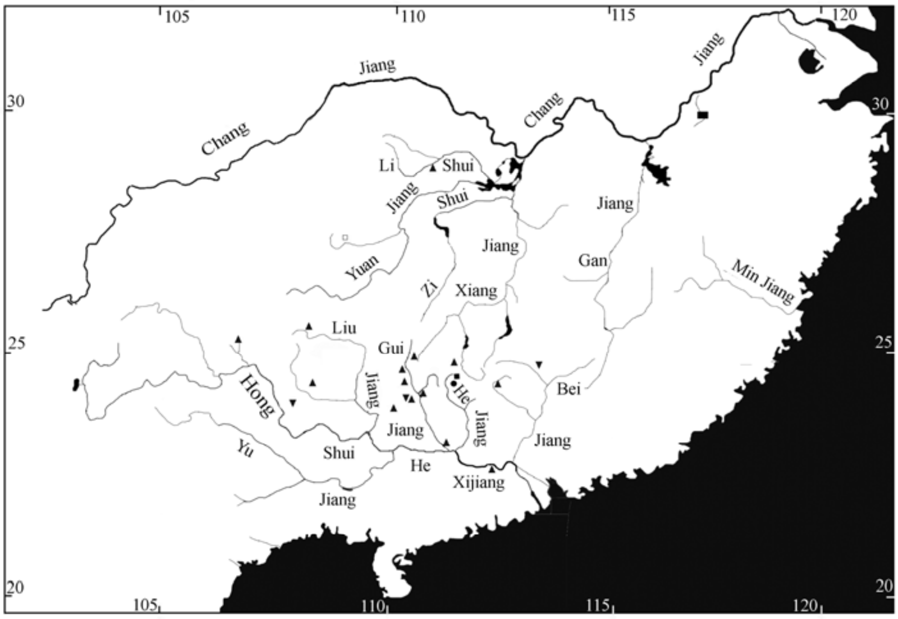


Fig. 1 Distributions of five species of *Parasinilabeo* and *Parasinilabeo longiventralis* sp. nov.

P. assimilis (▲), *P. microps* (□), *P. maculatus* (▬), *P. longicorpus* (▼), *P. longibarbus* (●), *P. longiventralis* (■).

2 Results

2.1 *Parasinilabeo longiventralis* sp. nov.

Holotype: KIZ 2002051115, 58.5mm SL. Hejiang River basin of the Zhujiang River drainage in Fuchuang County, Guangxi, China. Collected by LAN JH., May, 2002.

Paratypes: KIZ 2002051110, 12–14, 4 specimens, 56.3-67.0 mm SL. The same data as the holotype.

2.1.1 Diagnosis *Parasinlabeo longiventralis* can be distinguished from its congeners by the following characteristics (Tab. 2): maxillary barbels were almost equal to rostral barbels; the pelvic-fin is 83.7–89.4%, the distance between the ventral-fin origin to anal-fin origin; a longitudinal wide black stripe extends along the posterior lateral line; irregular brown pigments present on both sides of the body. *P. longiventralis* can be further distinguished from its congeners, except *P. longcorpus*, by having the pharyngeal teeth formula 2.3.5–5.3.2. *P. longiventralis* is different from *P. assimilis* because it has a more depressed body. *P. longiventralis* is different from *P. microps* as it has fewer lateral line scales (38–39 vs 41–44) and shorter caudal-penduncle length (14.1–16.2% vs 17.8–19.0% SL). *P. longiventralis* is different from *P. maculatus* as it has fewer lateral line scales (38–39 vs 40–42), fewer circumpeduncular scales (16 vs 18), fewer branched dorsal-fin rays (7 vs. 8), shorter more slendercaudal-peduncle, shorter snout (41.6–45.7% vs 47.9–50.5% HL), larger eyes (24.8–27.4% vs 19.4–23.6% HL) and the narrower interorbital space (41.9–47.7% vs 51.8–56.1% HL). *P.longiventralis* is different from *P.longcorpus* because it has a less slender body. *P.longiventralis* is different from *P. longibarbus* as its rostral cap has vertical grooves compared to smooth.

2.1.2 Description Morphometric and meristic measurements are given in Tab. 1 and Tab.2. General body appearance and morphology of the mouth are illustrated in Fig.2 and 3. Head is depressed in the anterior area. Body greatly compressed from nape of head to caudal-fin base. Dorsal profile of body gradually ascends from the tip of the snout to the dorsal-fin origin, then descends from there to the cadual-fin base. The highest part of the body is at the dorsal-fin origin. The ventral profile is concave from the tip of the snout to the pelvic-fin origin and, from the anal-fin origin to the base of the caudal-fin base. The snout is round and blunt. The mouth is interior. The rostral cap is suspended vertically and covers the upper lip and upper jaw. The prefringe of the rostral cap bearing vertical groove and is covered by dense fleshy papillae. The vertical groove on the middle of the rostral cap deeper and divide the rostral cap into tiny fimbriations. The upper lip retrogresses to become a row of tiny lobes, concealed between the rostral cap and the upper jaw. The rostral cap is connected to the lower lip around the corners of the mouth. The lower lip has a wide freshy papillate band. A shallow groove divides the lower lip into a thin anterior margin and posterior part. The lower lip lies behind the lower jaw. Both the upper and lower jaw have a sharp horny edge and both the rostral barbels and maxillary barbels are present. Rostral barbels extend posteriorly to the anterior edge of the nostril. Maxillary barbels extend posteriorly to the area between the anterior edge and half-way to the eyes. A lachrymal groove under the base of the rostral barbels extends obliquely down to the conjunction of the rostral cap and lower lip. A postlabial groove merges with the lachrymal groove and is restricted to corners of mouth. The nostrils are nearer to the anterior margin of the eyes than to the tip of the snout. The eyes are small, situated dorsolaterally in the anterior half of the head. The snout length is 41.6–45.7% HL. Interorbital spce wide are(41.9–47.7% HL) and longer than the diameter of the eyes. Scales are moderately large and abdominal scales are smaller. Abdominal scales in the front of tip of the pectoral-fin embedded under the skin. Pre-dorsal scales are smaller and anteriorly embedded under the skin. A lateral line completes and runs horizontally.

The dorsal-fin origin is vertically anterior to the pelvic-fin origin and nearer to the tip of the snout than to the caudal-fin base. The dorsal-fin has three unbranched rays and seven branched rays. The distal margin of the dorsal-fin is slightly concave. The pectoral-fin reaches slightly beyond halfway to the pelvic-fin origin and its distal margin is round. The longest second branched pectoral-fin ray is shorter than HL. The pectoral-fin origin is nearer to the pelvic-fin origin than to the tip of the snout. The pelvic-fin origin is nearer to the anal-fin origin than to the pectoral-fin origin and nearer to the tip of the snout than to the

Tab. 1 Morphometric data for *Parasinilbeo longiventralis* sp. nov.

Characteristic	Holotype	Paratypes (*n*=4)	Mean	*SD*
Total length (mm)	75.6	74.2-85.3	77.4	4.5
Standard length (mm)	60.4	56.3-67.0	60.0	4.2
% Standard length				
Body depth	23.5	23.5-28.3	24.7	2.0
Head length	22.9	21.5-23.6	22.7	0.8
Caudal-peduncle length	15.5	14.1-16.2	15.3	0.8
Caudal-peduncle depth	11.2	10.7-11.7	49.4	0.4
Predorsal length	49.2	48.1-50.8	23.4	1.0
Prepectoral length	22.5	22.4-24.3	54.1	0.9
Preventral length	52.3	53.6-56.3	76.1	1.5
Preanal length	74.2	75.3-77.4	11.3	1.3
% Head length				
Head width	61.5	57.4-62.5	60.6	2.1
Head depth	64.3	64.2-72.0	67.1	3.5
Snout length	41.6	42.4-45.7	43.3	1.7
Eye diameter	25.0	24.8-27.4	26.0	1.1
Postorbital length	35.6	34.5-36.0	35.5	0.6
Interorbital width	45.6	41.9-47.7	45.7	2.3
Mouth width	26.6	25.1-28.3	26.2	1.3
Rostral barbels length	20.3	18.0-20.8	19.4	1.1
Body width	18.4	14.9-17.3	16.5	1.5
Dorsal-fin length	101.8	97.3-109.1	102.1	5.0
Anal-fin length	78.8	71.5-81.0	77.3	4.0
Pectoral-fin length	93.7	89.8-99.5	94.8	3.5
ventral-fin length	84.1	80.5-90.4	84.7	3.8
Length of caudal-fin	108.3	108.2-125.7	116.4	8.2
Other proportions and ratios				
CPD/CPL(%)	72.2	68.5-82.9	74.2	5.4
Gape width /head width(%)	43.2	41.4-45.2	43.2	1.5
Pectoral-fin length/DPV(%)	67.9	62.8-65.9	63.9	1.9
Pelvic-fin length/DVA(%)	89.4	83.7-88.7	85.5	2.4
BW/BR	90.4	78.3-90.0	85.1	5.0
CL/ CML	2.0	2.1-2.4	2.2	0.2

CL：Length of caudal-fin; CML：Length of median ray of caudal-fin; CPD：Caudal-peduncle depth; CPL：Caudalpeduncle length; DPV：Distance of pectoral-fin to ventral-fin origin; DVA：Distance from pelvic-fin to anal-fin origin.

caudal-fin base. The tip of the depressed pelvic-fin reaches beyond the anus. The distal margin of the pelvic-fin is straight. The anal-fin origin is separated from the anus by 1–2 scales and is nearer to the pelvic-fin origin than to the caudal-fin base. The distal margin of the anal-fin is straight. The caudal-fin is deeply forked and longer than the head length (108.2–125.7% HL). The length of the longest caudal-fin rays is 2.0–2.4 times as long as that of the shortest rays.

The gas bladder has two chambers, the anterior one is round and wider than the posterior chamber, and the posterior one is stick-like, 1.7 times as long as the anterior chamber. The intestines are long and form many coils. Pharyngeal teeth has three rows, 2.3.5 – 5.3.2, with pointed tips. Gill rakers are on the

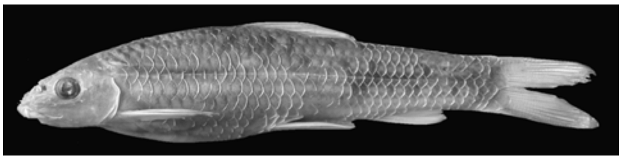


Fig. 2 The lateral view of *Parasinilabeo longiventralis* sp nov., KIZ 2002051115, Holotype, 58.5 mm SL



Fig. 3 The ventral view of the mouth of *Parasinilabeo longiventralis* sp. nov., KIZ 2002051115, Holotype, 58.5mm SL

outer side of the first gill arch 16 (1).

2.1.3 Color pattern in formalin Preserved in formalin, body is gray dorsally, and yellowish ventrally. Dorsal-fin has a black membrane between the rays. A longitudinal wide brown stripe extends along the lateral line from below the vertical middle of the dorsal-fin base to the caudal-fin base. Two indistinct brown stripes on the flank, each above and below the lateral line. Irregular brown pigments are present on the sides of the body.

2.1.4 Distribution Only known from the Fuchuanjiang River, a tributary of the upper Hejiang River (in the Zhujiang River Drainage) at Xinhua Village, Fuchuan County, Guangxi Province of China.

2.1.5 Habitat *Parasinilabeo longiventralis* occurs in the Karst area where many underground caves are connected to the surface river. This species inhabits the underground caves during the dry season. It can swim to the surface river when the subterranean water flows out during the flood season. *P. longiventralis* can be found in the area where P. longibarbus lives.

2.1.6 Etymology It is from the Latin *longus* (long) and *ventralis* (ventral), meaning longer pelvic fin.

3 Discussion

Parasinilabeo longiventralis sp. nov. can be distinguished from all other congeners by having several main morphometric and morphological characteristics (Tab. 2). The first distinction is that maxillary barbels of *P. longiventralis* are almost equal to rostral barbels (vs maxillary barbels absent or concealed in the corner of the mouth or longer than rostral barbels). The percentages of maxillary barbels against rostral barbels for *P. longiventralis* and other four species of *Parasinilabeo* except *P. microps* without maxillary barbels are listed in Tab. 2 and its scatterplot can be seen in Fig. 5. The scatterplot reveals that *P. longiventralis* and *P. longibarbus* are obviously detached respectively from *P. assimilis*, *P. maculatus* and *P. longicorpus* which are mixed together.

The second distinction is that pelvic-fin origin of *P. longiventralis* is closer to the anal-fin origin. Fig.4 reveals that the longer pelvic-fin segregates *P. longiventralis* from *P. assilimis*, *P. microps*, *P. maculatus*, *P. longicorpus* and *P. longibarbus*.

Besides the maxillary barbels and pelvic-fins distinction, *P. longiventralis* further differs from *P. assilimis* by having the following characteristics: a brown stripe running along the posterior lateral line (vs without a stripe running along the lateral line); irregular brown pigments on the sides of the body and two illegible brown stripes above the lateral line (vs no pigments on the sides of the body and no stripe above the lateral line); the body behind the nape of the head is heavily compressed (vs cylindrical anteriorly and compressed lightly behind the anal-fin origin); the pharyngeal teeth formula is 2.3.5–5.3.2 (vs 2.4.5–5.4.2); abdominal scales are in the front tip of the pectoral-fin embedded under the skin (vs scales on the abdomen embedded under skin).

Parasinilabeo longiventralis is further distinguishhed from *P. microps* by the presence of maxillary barbels (vs absent); a wide stripe on the posterior lateral line and irregular pigments on the body (vs no stripe on the lateral line and no pigment on the body); two brown illegible stripe respectively above and under the lateral line (vs no stripe on sides of the body); the pharyngeal teeth formula is 2.3.5–5.3.2 (vs2.4.5–5.4.2); fewer lateral line scales (38–39 vs 41–44); shorter caudal-penduncle length (14.1–16.2% vs 17.8–19.0% SL); abdominal scales are in the front tip of the pectoral-fin embedded under the skin (vs smaller scales

Tab. 2 Comparison of meristic and morphometric characteristics among *Parasinilabeo longiventralis* sp. nov. and other five species of *Parasinilabeo*

Species	*P.longiventralis*	*P.assimilis*	*P.microps*	*P.maculatus*	*P.longicorpus*	*P.longibarbus*
n	5	10	5	5	10	8
D	iii-7	iii-7	iii-7	iii,8	iii,7	iiii,8
P	ii,10-12	i,13-14	i,10-12	i,12-13	i,13-14	iii,12
V	ii,7-8	i,8	i,8	i,7	i,7	i,8
A	ii,5	ii,5	ii,5	ii,5	ii,5	ii,5
LLS	38-39	39-40	41-44	40-42	38-42	37-40
SL-D	4.5-5.5	4-5	5	5.5	4.5-5.0	5-6.5
SL-V	3-4	4-5	3-4	4	2.5-3.5	4-5
PS	12-13	11-14	13-16	12-14	13-14	15-17
CS	16	16	16	18	16	16
SL(mm)	74.2-85.3	61.1-88.1	61.0-77.6	84.1-117.3	77.4-91.6	43.9-53.3
DVA(mm)	12.7-14.5	11.0-15.9	14.2-18.0	18.8-26.6	3.6-4.4	9.7-12.1
BR(mm)	2.53-2.81	2.53-4.24	2.2-3.2	3.0-5.1	18.9-23.5	1.9-6.5
% SL						
Body depth	23.5-28.3	22.5-29.4	19.2-24.3	23.6-28.2	14.5-18.1	24.1-30.6
HL	21.5-23.6	17.5-25.8	22.2-23.6	20.4-22.5	19.1-21.8	22.0-24.8
CPL	14.1-16.2	11.1-21.1	17.8-19.0	17.2-20.3	14.8-18.1	14.1-17.6
CPD	10.7-11.7	11.5-23.5	10.7-12.0	12.1-13.4	8.4-11.8	9.5-12.7
%HL						
Snout length	41.6-45.7	45.1-61.1	41.3-47.6	47.9-50.5	39.3-47.6	37.9-44.3
Eye diameter	24.8-27.4	18.9-31.6	20.4-26.8	19.4-23.6	20.2-26.7	19.8-31.0
Interorbital width	41.9-47.7	40.3-62.7	40.7-46.2	51.8-56.1	41.6-49.2	46.5-53.1
other percentage						
Ventral-fin length/DVA	83.7-89.4	63.2-79.9	76.3-82.5	62.2-77.7	61.5-78.9	63.4-72.8
BM/BR	78.3-90.4	33.2-45.1		24.1-40.1	16.0-51.4	101.3-203.7

A：Number of anal-fin rays; BR：Rostral barbels length; BM：Maxillary barbels length; BW：Body width；CL：Length of caudal-fin; CML：Length of median ray of caudal-fin; CPD：Caudal-peduncle depth; CPL：Caudal-peduncle length; CS：Circumpeduncular scales; D：number of dorsal-fin rays; DPV：Distance of pectoral-fin to ventral-fin origin; DVA：Distance from pelvic-fin to anal-fin origin; HL：head length); LLS：lateral line scales; P：Number of pectoral-fin rays; PS：Predorsal scales; SL：Standard length; SL-D：Scales between lateral line and dorsal-fin origin; SL-V：Scales between lateral line and ventral-fin origin; TL：Total length; V：Number of ventral-fin rays.

sticking to the surface of the skin on the abdomen).

Parasinilabeo longiventralis is further different from *P. maculatus* because of the following characteristics: fewer lateral line scales (38–39 vs 40-42); fewer circumpeduncular scales (16 vs 18); fewer branched dorsal-fin rays (7 vs 8); the pharyngeal teeth pattern 2.3.5–5.3.2 (vs 2.4.5–5.4.2); shorter caudal-peduncle length (14.1–16.2% vs 17.2–20.3% SL); lower caudal-peduncle depth (10.7–11.7% vs 12.1–13.4% SL); shorter snout (41.6–45.7% vs 47.9–50.5% HL); smaller eye diameter (24.8–27.4% vs 19.4–23.6% HL); narrower interorbital space (41.9–47.7% vs 51.8–56.1% HL); abdominal scales in the front tip of the pectoral-fin embedded under the skin (vs all abdominal scales embedded under the skin); a brown stripe running along the posterior lateral line (vs a black stripe running along the lateral line); irregular pigments on the sides of the body (vs a black bar above the pectoral-fin).

Parasinilabeo longiventralis can be further distinguished from *P. longcorpus* through the following characteristics: the body is shorter (vs slender; body depth is 23.5–28.3% vs 14.5–18.1% SL); the dorsal profile convex and the ventral profile concave (vs the dorsal profile and the ventral profile straight); abdominal scales in the front of tip of the pectoral-fin

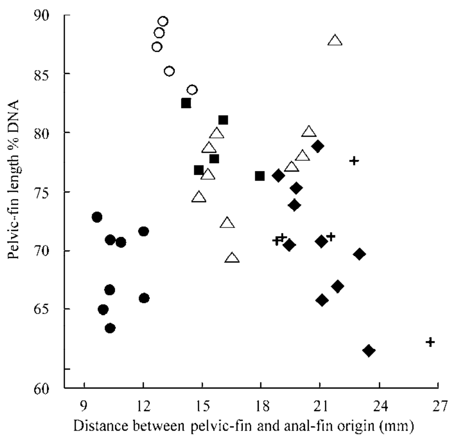


Fig. 4. Scatterplot of pelvic-fin % DVA against distance between pelvic-fin origin and anal-fin origin for six species of *Paralsiniabeo*

P. longiventralis sp. nov. (○); *P. assimilis* (△); *P. microps* (■); *P. maculatus* (+); *P. longicorpus* (◆); *P. longibarbus* (●).

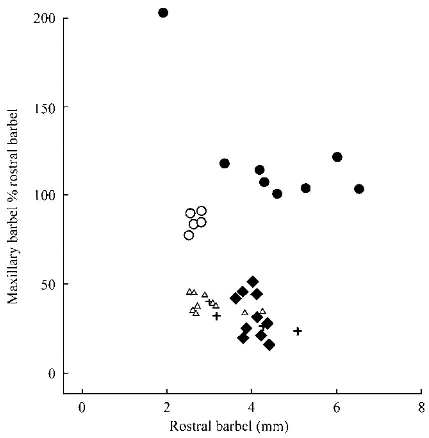


Fig. 5. Scatterplot of BM % BR against the rostral barbels for five species of *Parasinlabeo*

P. longiventralis sp. nov. (○); *P. assimilis* (△); *P. maculatus* (+); *P. longicorpus* (◆); P. *longibarbus* (●).

embedded under the skin (vs all abdominal scales embedded under the skin); a wide stripe on the lateral line posteriorly and irregular pigments on the sides of the body (vs no stripe on the lateral line and no pigment on the sides of the body).

Parasinilabeo longiventralis and *P. longibarbus* are distributed in the Karst area and stay in the underground caves during the dry season. They have longer maxillary barbels than other species of *Parasinilabeo*. Besides the maxillary barbels and pelvic-fin, they are different because of the following characteristics: *P. longiventralis* has a rostral cap with vertical grooves(vs rostral cap smooth); the pharyngeal teeth formula is 2.3.5–5.3.2(vs3.4.5–5.4.3); abdominal scales are in the front of tip of the pectoral-fin embedded under the skin (vs smaller scales sticking to the surface of the skin on the abdomen); a wide brown stripe running along the posterior lateral line (vs an obvious black stripe running along the lateral line); irregular pigments on the sides of the body (vs no pigments on the sides of the body).

Acknowledgements: This work was funded by the National Basic Research Program of China (2003 CB 415103) and the Major Research Plan of NSFC (90411002). We offer our heartfelt thanks to Mr. LAN J.H. , Animal Husbandry and Fishery Bureau of Du'an County, Guangxi for presenting specimens. We are grateful to Dr ZHANG E and Mr YUAN LY., Institute of Hydrobiology, the Chinese Academy of Sciences for their help measuring the material of *P. maculatus*, *P. longicorpus* and *P. longibarbus*. HUANG Y.F. also expresses many thanks to Dr YANG J. of the Kunming Institute of Zoology for taking photographs of *P. maculatus* and *P. longicorpus* .

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Appendix 1 Comparative material

Parasinilabeo assimilis. KIZ1987000124, 125, 777, 3 ex, May 1987, Tianhe Village, Luocheng County, Guangxi. KIZ 2005004008, 1ex, 2005, Dazhang Village, Jinxiu County, Guangxi. KIZ 2002051869, 73, 78, 79, 85, 86, 6 ex, August 2002, Guanyin Village, Gongcheng County, Guangxi.

Parasinilabeo microps. KIZ 9905302, 9905302 (a), 9905302 (b), 9905630, 9905656, 5 ex, May 14 th 1999, Longjia Village, Jiangkou County, Guizhou.

Parasinlabeo maculatus. IHB 83IX2133-35, 83IX2138-39, August 1983, Qiupu River in Shitai County, Fujiang.

Parasinilabeo longicorpus. IHB 75IV2627, 29, 31-32, 35-36, 42-43, 45, April 1975, Lipu County, Guangxi.

Parasinlabeo longibarbus. IHB 2002051387, 2002051405-07, 10, 13, 24-25, May 2002, Hejiang in Fuchuan County, Guangxi.

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张树义，男。1994 年获法国居里大学生态学博士学位。现为华东师范大学生命科学院教授。

张树义是我国第一个长期在亚马逊热带雨林进行野外研究与考察的生态学者，曾在法国国家科研中心位于法属圭亚那原始森林里的生态站工作 19 个月，研究新大陆灵长类动物的行为生态以及南美热带雨林中的动植物协同进化关系。博士论文“法属圭亚那棕色卷尾猴的领域利用行为，取食行为及其对种子的传播作用”被评为居里大学优秀论文。目前的研究主要集中于翼手目动物，包括蝙蝠形态、回声定位与分子的比较分类学研究，蝙蝠回声定位的神经调控，蝙蝠对磁场的感应，蝙蝠特殊繁殖对策的生理与分子机制，蝙蝠冬眠的生理与分子机制，大陆与岛屿之间的基因流，功能基因的进化，蝙蝠与其所携带病毒之间的协同进化等；其中相当多的研究是与国内外学者合作开展。关于翼手目的主要学术成果包括：1)揭示蝙蝠回声定位叫声频率与耳长之间为负相关；2)发现大足鼠耳蝠食鱼/南蝠食鸟的特殊食性；3)确定了三叶蹄蝠以及亚洲小型菊头蝠的分类地位；4)揭示菊头蝠为类 SARS 病毒的自然宿主，且冠状病毒与蝙蝠宿主之间存在一定的协同进化关系；5）发现棕果蝠具有与人类相似的月经现象；6）揭示蝙蝠利用磁极罗盘定向；7）揭示与语言相关的 Foxp2 基因在蝙蝠家族加速进化；8)发现并命名了一个蝙蝠新物种——北京宽耳蝠。这些研究发表在 *Science*、*PLoS One*、*Emerging and Infectious Disease*、*Proceedings of the Royal Society B*、*Biology of Reproduction*、*Journal of Mammalogy*、*Journal of Zoology* 等国际知名杂志。2000 年获国家自然科学基金委杰出青年基金项目资助。